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Finance Mechanisms for Lowering the Cost of Renewable Energy in Rapidly Developing Countries

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A CPI Series

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Descriptors

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Related CPI Reports	Meeting India's Renewable Energy Targets: The Financing Challenge
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About CPI

Climate Policy Initiative is a team of analysts and advisors that works to improve the most important energy and land use policies around the world, with a particular focus on finance. An independent organization supported in part by a grant from the Open Society Foundations, CPI works in places that provide the most potential for policy impact including Brazil, China, Europe, India, Indonesia, and the United States.

Our work helps nations grow while addressing increasingly scarce resources and climate risk. This is a complex challenge in which policy plays a crucial role.

Executive Summary

Renewable energy financing in emerging economies faces particularly daunting challenges, but there are creative policy solutions that could potentially reduce the cost of renewable energy support by as much as 30%.

In this series, we look at two potential solutions:

- **Reduce the cost of using debt sourced from the developed world:** Index renewable energy tariffs to foreign currency, in so doing eliminate the currency hedging costs that are responsible for the largest share of the difference between developed world and rapidly emerging country debt costs.
- **Improve the cost-effectiveness of domestic renewable energy support programs:** Provide lower-cost debt through debt concession programs, which our research shows could lower the total cost of providing required support.

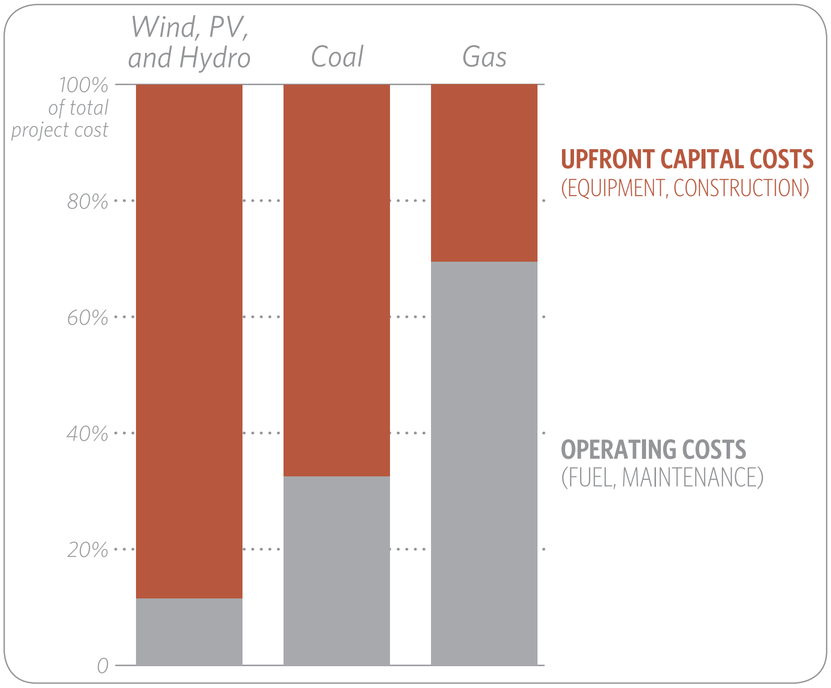
Many developing countries are looking to grow their renewable energy portfolios to meet environmental, economic, business, and energy security goals, particularly as the costs for these technologies are declining rapidly.

If debt were available at terms and interest rates similar to those found in developed countries, the cost to governments and consumers of financing renewable energy in rapidly developing economies could be as much as 30% lower.

However, despite significant labor, land, and construction cost advantages, rapidly emerging countries must often pay as much for renewable energy as the US and Europe, and sometimes much more. The difference is in the cost of financing renewable energy projects; more specifically, the cost and terms of debt. Our work in India indicates that the cost and terms of debt can add 24-32% to the cost of utility-scale wind and solar PV projects.

The high cost of debt creates other problems. Regulatory solutions that reduce financing costs in other countries – such as stable long-term contracts or reliable feed-in-tariffs – are less effective in many rapidly developing countries because high debt costs restrict the ability to fine tune financing in response to policy signals. Further, issues in the debt markets can impact equity investment, as developers may not be willing or able to refinance completed projects with debt. As a result, these developers may run out of equity to invest in the next set of projects.

Figure ES1: Based on data published by the EIA, the percent of total project costs consumed by upfront capital costs varies from 66-69% for coal, 24-37% for gas, and 84-93% for wind, PV, and hydropower. This figure illustrates the high proportion of renewable energy project costs spent on up-front capital.



High debt costs are not unique to renewable energy, its risks, or the relevant policy; rather they generally reflect the high interest rate environments often found in growing economies with higher inflation, large infrastructure needs, heavy government borrowing, and less developed financial systems.

The result is that project loans in emerging economies have higher debt costs than in the US or Europe. However, as things stand, using debt denominated in a foreign currency is not a viable option for a project developer, because the cost of the hedging arrangements required to convert dollar, yen, euro, or sterling into local currency over the life of the loan eliminates most or all of the cost advantage of bringing in lower cost foreign capital.

Why is the cost of financing an important issue for renewable energy?

The majority of renewable energy project costs occur at the beginning of the project with the initial capital investment. As Figure 1 illustrates, the initial capital cost of wind, photovoltaic, and hydropower often comprise nearly 90% of total project costs. In contrast, the initial investment of gas projects represent only one-third of the total discounted lifetime costs. The ratio of initial capital investment to operating costs varies from plant to plant. In the case of coal and gas, the exact proportions depend in large degree on fuel expenses, which can drive operating costs.

However, by this simple measure, initial capital costs and therefore financing are roughly 60% more important for renewable energy. Most renewable energy projects use debt – either directly at the project level or on the balance sheet of the corporate owner – to reduce the cost of financing. Therefore, the availability of low-cost debt is a critical driver of renewable energy costs.

Why is debt more expensive in rapidly developing countries?

In many rapidly developing countries, debt is less available and significantly more expensive than in developed markets. Developing countries have many competing needs for capital. As the economy grows, countries build infrastructure and their businesses expand their offerings, all of which increases the demand for debt. However, immature financial markets, higher risks, inflation, and the lower saving rates of young populations limit the supply of capital available for long-term investment. These dynamics lead to debt that is more expensive and less available.

What are the solutions?

If debt were available at terms and interest rates similar to those found in developed countries, our research shows that the cost of renewable energy support in rapidly developing economies would be as much as 30% lower. Thus, two obvious solutions present themselves:

1. Bring in developed world capital to these markets at lower interest rates. While the higher risks and weaker capital markets in many developing world countries present barriers that increase costs, we believe that many of these risks can be managed and lower financing costs provided, by linking a portion of renewable energy feed-in-tariffs or contract prices to foreign currencies.
2. Subsidize renewable energy project debt to bring interest rates down to the levels of developed world debt. Our research shows that even without bringing in foreign capital, developing world nations could benefit. In fact, our analysis demonstrates that incentives needed to make projects attractive to renewable energy project developers in developing world economies could cost 30% less if delivered through subsidized debt rather than through higher tariffs or subsidies on top of wholesale energy prices.

Organization of this series

Following this introduction, we set out three briefs, each exploring one part of the potential mechanisms identified here for lowering the cost of renewable energy financing in emerging economies.

Part 1. The first brief explores partial indexation of renewable energy tariffs to foreign currencies as a mechanism for attracting and lowering the cost of foreign debt financing for renewable energy projects.

Part 2. The second brief of the series discusses how and why concessional debt could be a more cost-effective way of incentivizing energy infrastructure and renewable energy.

Part 3: The final brief of the series discusses the set of implementation options facing policymakers implementing a concessional debt program, and risks and tradeoffs around these options

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Brief 1: Indexing Tariffs to Foreign Currency

As of 2013, renewable energy projects in the U.S. or Europe can secure long term loans against their projects with interest rates that are typically fixed around 7% per year for a 10 to 15 year term. However, a project in India with a similar risk profile would have to pay up to 14% for debt with similar terms, if it were available,[1] raising the project costs by as much as 32%.[2] With the cost of debt being such an important factor in the cost of renewable energy, an obvious question is: Can developing economies benefit by bringing in U.S. or European debt to finance renewable energy projects?

We believe the answer to that question is yes, but only if there is a mechanism to protect against currency exchange risk, which, based on our analysis, is responsible for most of the difference between the interest rates of the U.S. and Europe and those of most developing economies. Not only does currency risk raise the cost of borrowing, it is also a critical stumbling block that many large investors face when investing in emerging market projects, particularly those, like institutional investors, that are seeking predictable, steady returns.

One method to reduce the impact of currency risk on projects using foreign currency debt is for developing world governments to index a portion of the payments made for renewable energy output to the relevant foreign currency. In so doing, the government would need to accept currency risk exposure, but could potentially benefit from a reduction in the cost of supporting renewable energy of 30% or more.

In this brief, we first set out the reasons why currency risk is such a significant contributor to the cost of renewable energy financing. We then outline some of the risks that the host country would be assuming by indexing feed-in-tariffs to foreign currency. We conclude by presenting the impact of currency hedging costs on a number of developing world countries with significant renewable energy goals. Future CPI analysis will focus on identifying countries where this policy mechanism would be particularly effective.

1 In practice, very little long term fixed rate debt is available in India, so project developers are forced to settle for slightly lower priced (12%) variable rate debt and accept all of the interest rate risk associated with it.

2 See the December 2012 CPI report, "Meeting India's Renewable Energy Targets: The Financing Challenge."

The central role of currency hedging costs

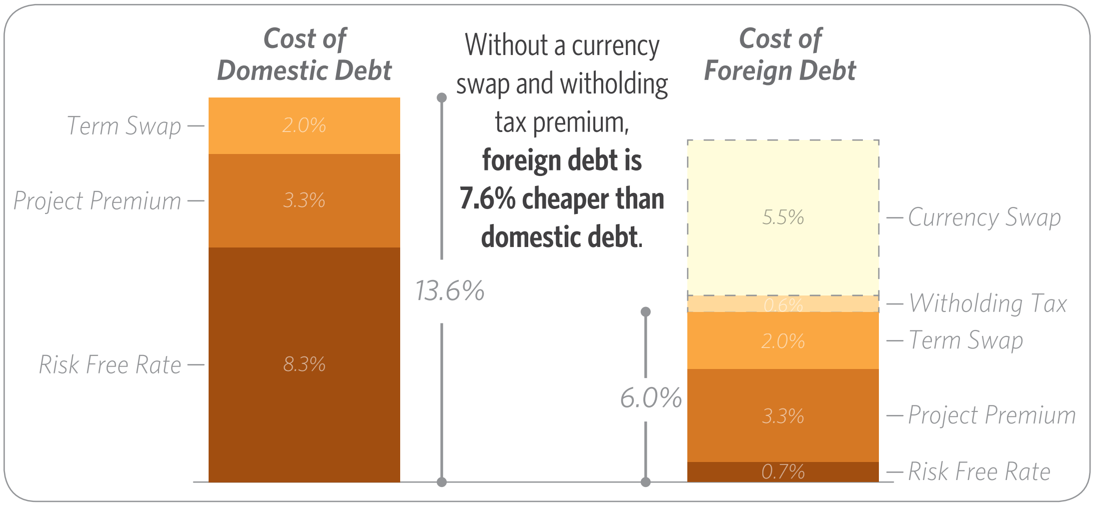
The cost of the currency hedge offsets the advantage of using foreign debt

Investors and economists often blame country risk for the higher investment returns – or higher interest rates in the case of loans – that are demanded in one country compared to another. The generic term country risk actually covers a number of risks including inflation, government policy including deficits and borrowing, and the economy, including exposure to commodity prices. However, on closer inspection, the truth is that most of this country risk premium is expressed in the cost of converting the currency over the life of the project, or the currency hedge. Inflation, government borrowing, and economic growth all affect the supply and demand for a currency and therefore the exchange rate. In other words, for an investor, most of country risk is often currency risk.

If a project itself is solid, perhaps the biggest risk an investor faces is the potential devaluation of the currency in which the investment has been made. While an investor may be certain that the project will deliver a million Pesos in one year's time, if the Peso falls in value by 20% over that time, the U.S. based investor, with U.S. dollar investment needs, would face a 20% loss. Indeed, currency uncertainty can make it too risky for U.S. institutional investors to invest in Europe or the UK, let alone India, Mexico, or South Africa. So unless investors have offsetting liabilities in a host country, with an established, guaranteed, future need for pesos, rupees, or rand, investors must find ways to manage their exposure to currency risk to make the project a viable alternative to meet their investment goals.

Unfortunately, long term currency hedges can be expensive, as uncertainty and risks become greater and less clear over time and, crucially, as markets become thinner (few investors with dollars have set requirements for rupees in 15 years' time). Figure 1 compares the cost of finance of a typical project using domestic emerging market debt and foreign debt. In this example, locally sourced debt costs 13.6%, consisting of the local risk-free rate, a project premium, and a term swap to convert the variable risk-free rate into a 15 year fixed interest rate loan. In this example, before accounting for currency risks, the foreign-sourced debt costs 6.0%, consisting

Figure 1: The impact of the currency hedge on the cost of foreign debt



while achieving the same returns for equity investors; that is, returns high enough to encourage investment and the growth of the industry. Currency risk (represented by the cost of a currency hedge) appears to be the biggest obstacle for foreign currency lenders, so, a large prize is potentially in store for those countries that can find a way of reducing this cost. Paying renewable energy projects in tariffs indexed to U.S. dollars or another foreign currency could do just that. **If the cash flow upon which a loan is made were based in dollars, the currency risk incurred by the project developer would become minimal, and debt costs and project costs would fall.** In fact, imported oil, coal, and natural gas are typically priced in U.S. dollars and so benefit from access to capital in dollar terms. Therefore, to the extent that energy is a global commodity and that renewable energy competes in this market, it makes sense that it could be priced in dollars.

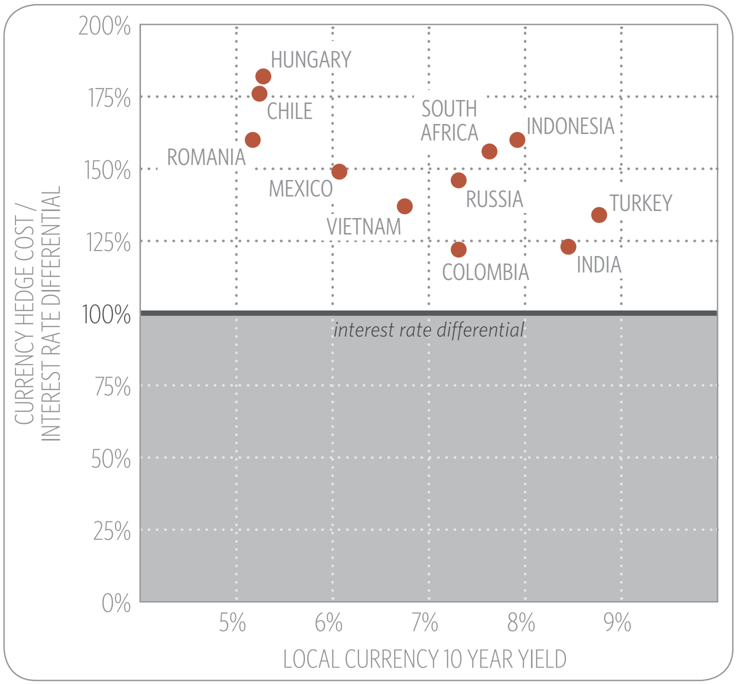
of the lower risk-free rate, and a similarly priced project premium and term swap. Thus, before accounting for currency risk and withholding taxes, the foreign-sourced debt is 7.6% cheaper. However, in this case the cost of the currency swap used as a hedge to mitigate currency risk was 5.5% per year, or 72% of the difference between foreign sourced debt and domestic debt. In other words, most of the advantage of using foreign debt is consumed by the currency hedge, even before accounting for transaction costs and other perceived risks.

The above example was drawn from our work in India, but the same pattern applies to a number of rapidly developing countries where rapid growth has led to higher interest rates. In fact, the differences between the debt cost in the U.S. and in emerging markets is largely a function of the difference in underlying interest rates, as can be seen in the yield curves of the respective treasury bonds. In Figure 2, we show that for a set of emerging countries with 10-year yields above 5% (at the time of writing, U.S. 10 year yields are approximately 2.6%) the cost of the respective 10-year currency hedge is between 20% and 80% more than the difference between the respective 10-year yields. In other words, the currency hedge costs more than the savings from borrowing in U.S. dollars rather than local currency.

Lower Finance Cost Leads to Lower Energy Cost

Our analysis in India indicated that lowering debt costs to levels close to that of U.S. renewable energy projects could reduce the levelized cost of energy (LCOE) for renewable energy projects by up to 30%,

Figure 2: The cost of currency hedges in rapidly developing nations is often greater than the simple difference in U.S. and local currency 10-year yields.

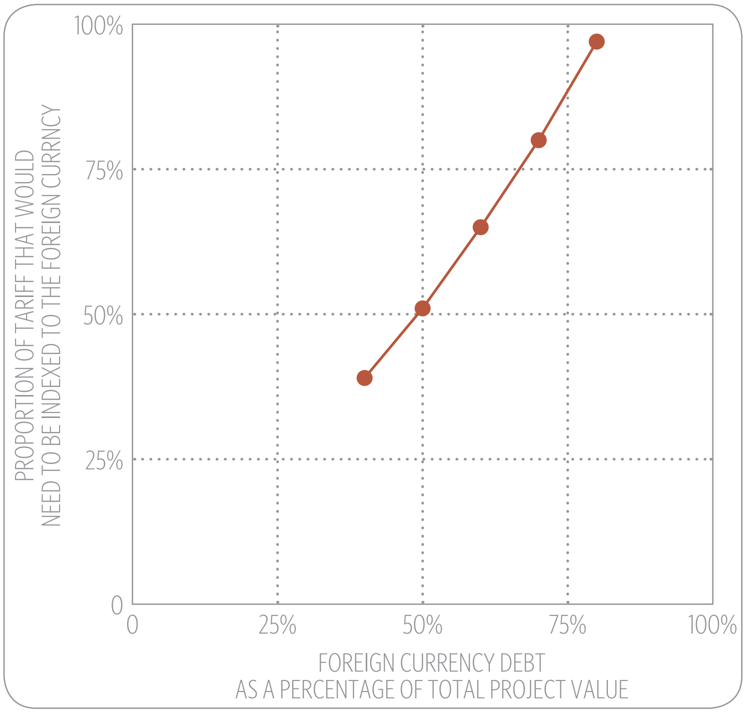


The risks and costs of indexing renewable energy tariffs to foreign currency

The 30% savings that could come from currency indexation and debt at U.S. interest rates is not without cost. Most significantly, the host country will need to take on currency risk. In fact, the ability to lower costs by providing currency-indexed tariffs lies on the premise that either the national government is better placed to manage these currency risks than the project developers, or that the national economy has offsetting risks. While in many cases both of these are likely to be true, determining whether currency indexation is appropriate (and how much currency indexation is prudent) depends on the particular circumstances of each country. That is, the extent to which an energy industry and its supporting national government might be better placed to accept currency risk than project developers depends on the specific issues that drive currency risk in the first place. These include:

- **Inflation differentials.** In theory, in the long term a currency should move against another so that prices stay relatively constant between the two countries. Thus, if one country had inflation 4% higher than the other, we would expect that the currency of the country with higher inflation would devalue by an equivalent 4% so that prices (in either dollar terms or local currency terms) stayed the same. In India in 2012, according to both IMF and the Reserve Bank of India (RBI – the Indian Central Bank), the expected average inflation differential between the U.S. and India was just under 2.5% over the next ten years. If inflation differentials were all that drove exchange rates, currency hedge costs would be 2.5% rather than the 5.5% we observed. However, things can change quickly. At the time of writing the Rupee's recent fall has, itself, fueled inflation expectations. The forecast 10-year differential with the U.S. is now somewhere between 4.3% and 5.4%, but the currency swap cost has also risen to 7.2%. If inflation were the only driver of exchange rate risk, a country would benefit from effective (local currency) interest rates that were 2-3% per annum lower, by indexing the tariff.
- **Relative valuation starting point.** Prices can take years to equilibrate, with currency values buffeted by shorter term factors. Thus, at any given point in time one currency could be overvalued relative to another. Every currency on our list in Table 2 is undervalued, most in the range of 30 to 60%. In the long term one could expect some return to parity, but differentials can last for decades. This starting point can overwhelm the interest rate differential as a currency valuation catches up or falls further behind.

Figure 3: Relationship between foreign currency debt share and amount of tariff that would need to be indexed, based on a typical emerging market model.



Source: CPI Analysis

- **Macroeconomic policy.** In the short term, exchange rates can be driven by the supply and demand for a currency and thus macroeconomic policy. A country with a current account surplus, perhaps because of exports or a budget surplus, should see its currency appreciate as the demand for its currency would be high, driving up the price.
- **Risk.** Finally, a hedge is likely to include a risk premium to reflect the uncertainty that currency fluctuations might be much larger than expected, as has indeed happened in India in 2013. If long term currency hedge markets are thinly traded, the risk premium could be higher.

So, with all that being said, is the potential 30% saving worth the risk? The answer is that in many ways these countries already do accept this risk. Oil, imported coal, and natural gas are priced in dollars. So if a currency weakens, the cost of these fuels rises. To the extent that renewable energy might be replacing some dollar denominated fossil fuel imports, the host government might be taking on no additional risk. And for the remainder, starting from a 30% discount can cover a lot of currency risk.

To reduce the risk, only a portion of the power purchase contract needs to be denominated in dollars or euros. Since equity seems to be more available at reasonable prices in countries like India, the dollar portion need only cover debt service. In practice, lenders require projects to have certain cash flows equivalent to something like 1.3 times the amount of cash required each year to pay interest and pay down the principal. Thus, the amount of the tariff that will need to be linked to dollars or euros will depend upon the proportion of a project that is supported by the foreign-currency-denominated debt. Figure 3 below illustrates the relationship between foreign currency debt share and the amount of the tariff that would need to be indexed to the foreign currency, based on a typical emerging market model.

Reducing the amount of the project that needs to be indexed to a foreign currency reduces the risk that currency devaluation offsets gains from the lower debt costs. As an example, take a project with a loan equivalent to 60% of the total project value, in this case only 65% of the tariff would need to be indexed to the dollar to cover the currency risk for the lender, reducing the risk by 35% compared to complete indexation.

However, the risk does remain. If the annual interest rate for a loan in local currency were 7% higher than an equivalent loan denominated in dollars, then a project with a 60% foreign currency loan would be cheaper in local currency only if the depreciation of the local currency were less than 4.5% per year. If the currency were to depreciate more than 4.5% per year, the impact of the energy price rising due to currency indexation would more than offset the lower cost of the energy due to lower interest rates.

Figure 4 broadens this example further, showing how much renewable energy would cost on average in local currency terms over the life of the project at different foreign loan amounts and different average levels of currency devaluation or appreciation. At loan-to-value ratios of 50%, 60% or 70%, the break even rate (where electricity prices are no more expensive than without foreign-currency-denominated, low-cost debt) is around 4.5%. However, with a 70% loan, electricity becomes even cheaper at lower levels of devaluation, but much less attractive at higher levels.

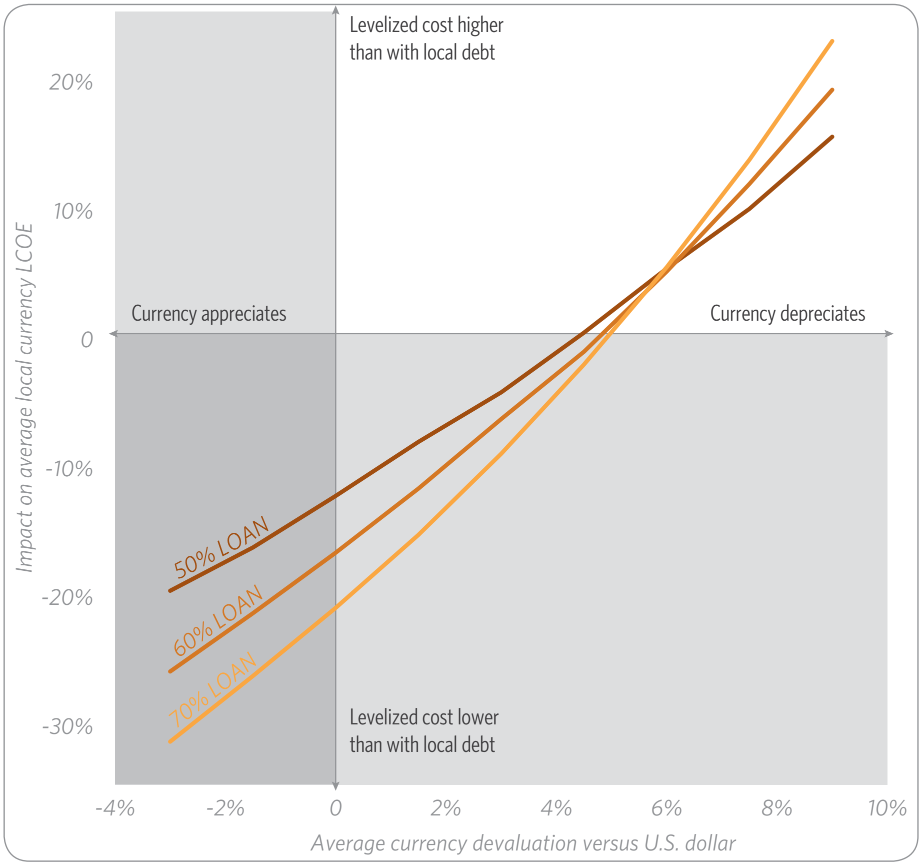
Table 1: Rapidly emerging economies with high interest and currency swap costs and ambitious renewable targets.

COUNTRY	10 YEAR BOND YIELD	10 YEAR CURRENCY SWAP	FORECAST AVERAGE INFLATION DIFFERENTIAL VERSUS U.S.	CURRENCY VALUATION VERSUS U.S. DOLLAR (2013)	2020 RENEWABLE ADDITIONS TARGET (GW)
Turkey	8.77	8.26	3.1%	-40%	~28[3]
India	8.45	7.18	5.4%	-60%	32.9[2]
Indonesia	7.92	8.5	3.2%	-30%	4.5[2]
South Africa	7.63	7.87	3.1%	-30%	16.9
Columbia	7.31	5.75	0.9%	-30%	~1[2,3]
Vietnam	6.75	5.67	5.1%	-60%	~8.5[1,3]
Mexico	6.07	5.16	1.1%	-40%	~24[3]
Hungary	5.28	4.88	1.1%	-40%	~4.2[3]
Chile	5.24	4.65	0.9%	-30%	~0.8[2,3]
Romania	5.17	4.12	0.8%	-50%	~7.4[2]

Source: the 10-year bond yield and the 10 year currency swap data are from Bloomberg, the inflation differential data are from the IMF and the World Economic Outlook Database, the relative currency valuation data are from the OECD, and the renewable energy targets are from IRENA and REN21. (1) primary energy target; (2) excluding large hydro; (3) Estimated from energy (GWh) targets assuming 3000 hours generation per year.

In the end, there remains a risk to the host country that a sudden devaluation could make the energy from the renewable project seem expensive to consumers and the public. This risk, in turn, creates a political risk that reaction against the high cost could imperil the contract, and therefore could create some risk perceptions for foreign investors' tariffs – as has happened previously with dollar-indexed, gas-fired power plants in the Indian state of Maharashtra. For this reason, dollar indexation

Figure 4: The impact of currency devaluation on the levelized cost of energy from renewable energy projects in local currency terms (at three loan amounts)



can only be a part of the solution, with the mix of policies supporting renewable energy – including low-cost debt - reducing exposure to the currency risk of the overall portfolio. However, within that constraint, tariff indexation can be attractive as a vehicle for attracting additional foreign investment in the sector and, in so doing, keeping renewable energy costs low.

A number of rapidly developing countries would benefit

Not all emerging economies would benefit to the same degree as not all developing countries have the same mix of inflation and growth that leads to high interest rates and hedging costs. In addition, some countries with these risks are already employing a currency risk management approach. Countries like Morocco, Croatia and, to some extent Egypt, have managed exchange rates that are set against the euro or U.S. dollar. In many ways these managed regimes make offering U.S. dollar or euro denominated tariffs much easier, as the central bank or currency board is already taking many of the risks outlined above. Morocco, for instance, already offers euro and dollar base tariffs for some of its renewable energy projects.

However, there remains a group of middle-to-low-income countries with ambitious targets that could benefit from the proposals here, as shown in the table below. Countries that are likely to benefit from indexation are those that have high interest rate environments and the related high currency swap costs. Many of the countries on this list also have ambitious renewable energy targets that will require investment, both foreign and domestic. The value to the host country will be greater if inflation and hence currency devaluation remains low over the course of the loan. Similarly, undervalued currencies could provide an opportunity for these proposals, if these currencies regress to the mean and appreciate as a result. Unfortunately, as demonstrated recently by India, this mechanism can be fraught, as undervaluation can be driven by currency devaluation which can, itself, stoke up inflation as the mechanism to close the gap, rather than currency appreciation. The table below sets out some of the key interest rate, inflation forecast, and relative valuation parameters against renewable energy ambition for a select group of rapidly developing countries.

Conclusion

Indexing renewable feed-in-tariffs to foreign currencies in order to attract foreign investment in renewables is not a silver bullet, nor would it be advisable as the major source of investment for renewable energy, for many of the same reasons that foreign investment itself is not a silver bullet. However, there certainly is room for it within the tool kit of renewable energy policy for rapidly developing economies. Its value and importance will depend on the situation of the country in question including risks, the macroeconomic situation, overall currency and balance of payment exposure, and the cost and regulation of renewable energy itself.

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Brief 2: Incentivizing Renewable Energy Development through Low-Cost Debt

Many rapidly developing countries see renewable energy as an important tool for increasing energy diversity and security, alleviating energy poverty, and for meeting environmental and climate change goals. However, the market does not factor the public benefits of meeting those goals into the cost of renewable energy. In most circumstances, clean energy still needs support to compete and provide an attractive return to investors and developers. Governments and regulators have typically relied upon price supports such as renewable energy credit markets, higher priced feed-in-tariffs and power purchase contracts, or tax credits to provide incentives. However, in rapidly developing economies where debt is expensive, it would often be more cost-effective for policymakers to reduce the cost of debt, and thereby reduce the level of price support needed to make the investment attractive to project developers. **There are two main reasons for this:**

- **When interest rates are high, less total support is required to make projects economically attractive to project developers when some of that support is used to buy down the cost of the debt rather than paid as a price support above prevailing market prices.**
- **Governments have advantages that enable them to provide a dollar-equivalent debt subsidy more cheaply than price supports.**

In other words, reducing the cost of debt means that fewer subsidies are required, and each dollar of subsidy is cheaper to provide. In this brief, we first describe why lowering the cost of debt will reduce the total amount of support required. We then explain why the cost of providing that support will also be lower under a concessional debt program. Future CPI analysis will focus on concessional debt program design for countries where this policy mechanism would be particularly effective.

The dynamics of rapidly developing countries often drive up the cost of domestic debt, which significantly increases the cost of renewable energy projects. Our work in India suggests that using concessional debt – alone or in conjunction with other support – can reduce the total cost of making renewable energy a viable investment proposition by 10 to 40 percent.

What do we mean by "support?"

We define support as the difference between the cost of the renewable energy option and the cost of the market alternative. In this case, the cost of the market alternative is the market price of energy typically derived from conventional generation such as gas or coal.

Common types of support include:

- Feed-in-tariffs that may be higher than prevalent market prices
- Tax credits
- Accelerated depreciation benefits
- Direct subsidies

In the case of low-cost debt, we define the amount of support as the difference between the cost of debt provided to the project and the cost of similar debt available on the markets. In either case, we look to maintain a return to project developers that would meet their return on equity hurdles.

Low-cost debt may reduce the total support required to make a project viable

Our analysis and modeling of specific projects in India demonstrates that less total support is required if that support is used to pay down the cost of debt rather than being paid as an incremental bonus on top of prevailing energy prices. There are three reasons for this finding:

1. Lower cost, long-term debt allows greater financial engineering that will reduce costs.

For a given level of borrowing, lowering interest rates reduces annual debt payments. An important criterion in determining how much a project can borrow is the percentage of a project's cash flows that are needed to service the debt. With lower interest costs, debt service costs fall, so more debt can be taken on without affecting the rating of the debt or raising its cost.

In rapidly developing countries with high debt costs, the relatively small spread between debt and equity reduces the value to a project's equity holders of increasing financial leverage. More specifically, the low spread reduces the incentive to create a secure tranche of cash flows to support debt service cash flow requirements, since there is little value in increasing leverage, or adjusting the profile of debt repayments to increase effective leverage over the project life.

2. If the low-cost loan support mechanism offers a degree of project validation or risk guarantee, projects may be able to secure additional low-cost debt from commercial lenders.

In certain markets, allowing commercial lenders to invest alongside the low-cost loan facility might improve the effectiveness of the program. Depending on the structure of the various debt tranches, the commercial debt could be less expensive than otherwise might be available. For example, if lenders regard the government loan facility as an implicit validation of the project's robustness, they may lower their required returns. For another, the government could choose to subordinate its debt to the commercial debt, choosing to accept a greater share of the default risk. This subordination would improve the risk profile of the commercial debt, thereby potentially lowering its cost.

However, while our research suggests that government sponsored lower cost debt may encourage more lenders to enter the market, neither these new lenders, nor existing lenders, would be likely to offer debt at lower cost or better terms. Only once the market matures and strong competition emerges between lenders will debt costs begin to fall.

3. Low-cost debt will improve the effectiveness of existing renewable energy policies.

While equity ownership encourages investors to balance the potential for windfall profits against potential losses, debt requires investors to focus more sharply on project viability and strategies for mitigating risk. As a result, where leverage through debt provides a significant financial upside to equity returns on projects, that is, where debt is significantly cheaper than equity, developers have a greater incentive to develop robust, low risk projects. Furthermore, since many renewable energy policies, like project license auctions or renewable energy credits, rely upon investors developing the lowest cost projects possible, as the difference between the cost of debt and equity becomes greater, the importance of debt, and therefore risk mitigation, becomes more important. In other words, with lower cost debt, policies that are designed to reduce costs will also provide incentives to develop more robust projects.

CPI Analysis of Renewable Energy Financing In India

Our analysis of specific renewable energy projects in India indicates that lower interest rates translate to significantly less total support – where we define support as the sum of price subsidies and the value of the debt concession required to make the projects economically attractive. As shown in Table 1 below, a 3-7% per year interest rate concession would reduce the total combined support by 10-26% for solar and 16-39% for wind. The results in any country will depend upon a variety of factors, including the state of the renewable industry equity markets (that is, how many people want to invest in ownership of the projects) as well as the debt markets, and other renewable energy policy. Nevertheless, the Indian example provides a guide as to the potential savings available.

Reduction in total support required when using interest rate concessions as a support mechanism in India (as of 2013)

INTEREST RATE CONCESSION	REDUCTION IN TOTAL SUPPORT	
	WIND	SOLAR
3%	-16%	-10%
5%	-27%	-18%
7%	-39%	-26%

Source: CPI Analysis. Note: Reduction in total support relative to that required without an interest rate concession.

The cost to governments of providing lower cost debt to renewable projects could, itself, be lower

In addition to reducing the overall support required for renewable energy projects, lowering the cost of debt will also reduce the cost of providing what support is needed. Thus, a host government may be able to provide subsidies that are worth more to developers than they cost to the government itself. This occurs for four reasons.

1. A national government can usually raise money at a lower cost than developers.

Since governments are continuously present in debt markets and lenders are comfortable with government debt, the transactional costs to the government of obtaining debt are lower. In addition, governments could potentially reduce developer risk, which would also reduce the cost of debt. For example, the Government of India can currently raise short term rupee denominated debt at 7.5-8.5%, while a renewable energy project raises short term debt at 11.0-13.0%. These benefits need to be offset against the cost of running the program.

2. A national government could provide a currency swap at a lower cost than developers.

Since the cost of debt is often cheaper outside of emerging economies, foreign debt could provide renewable energy developers with an additional source of funding. However, foreign debt needs to be converted into local currency over the life of the loan. The cost of this conversion, or hedge, is generally so high that it eliminates most of the cost advantage of bringing in lower cost foreign capital. For example, in India, the currency swap cost accounts for nearly half the total cost of foreign renewable energy debt (for more information, see the first brief in this series).

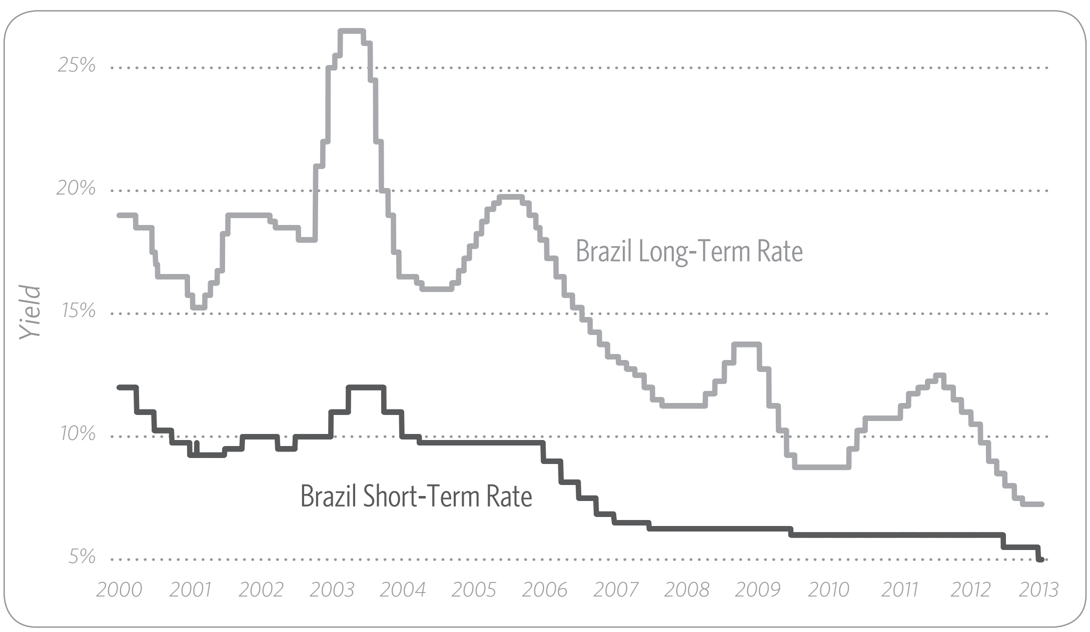
Governments are better positioned than developers to manage the cost of currency swaps and could choose to borrow foreign currency to lend to renewable energy projects, charging only the inflation differential as the currency (and term) swap cost rather than the current market rates.

3. A country may not need (or want) to hedge all of its foreign currency borrowings related to renewable energy, as renewable energy projects displace dollar denominated fuel imports.

As shown in Table 2, a number of rapidly developing countries rely on imported fuel to generate much of their electricity. Increasing the proportion of electricity generated from renewable sources would reduce the need for these countries to import coal and oil. Since coal and oil are priced in dollars, governments are effectively absorbing the cost of the currency hedge for those fuel sources, but not for renewable energy. This standard places renewable energy priced in local currency at a significant disadvantage, due to high cost of domestic debt in these countries (see the first brief in this series for more information).

Investing in renewable energy rather than importing fuels priced in dollars could also provide governments with a mechanism

Figure 6: This figure illustrates the long-term interest rates and managed short-term policy rates in Brazil. To manage high short term interest rates, Brazil has provided a lower long term interest rate for infrastructure projects



Source: Bloomberg

Table 2: Percent of Electricity Generated from an Imported Fuel Source, Selected Countries (2010)

COUNTRY	PERCENT
Turkey	58%
Chile	40%
Hungary	32%
Mexico	18%
India	11%
Romania	9%
Vietnam	2%
South Africa	1%
Indonesia	1%
Colombia	0%

Source: EIA data

for reducing their exposure to exchange rate risk.

4. Lower long term interest rates better reflect the social value of infrastructure investments than current market mechanics allow.

In rapidly developing countries, such as Brazil, Chile, Indonesia, Mexico, and Venezuela, observers believe that interest rates will decrease over the next few years.[3] However, market mechanics and thin long term markets mean that this expectation is not reflected in available long term, fixed rate loans. High short term rates discourage investment in infrastructure, which deliver value over a long time, and instead promote shorter-term investment. Higher short term investment can actually exacerbate inflation, the target of high interest rates. Lower-rate long-term loans reflecting the likely underlying rate could help overcome these market structure problems (for example, see Figure 6).

Conclusion

In rapidly developing countries, concessional debt is often a more cost-effective method of catalyzing investment in renewable energy than other forms of support. While the exact benefits vary, by subsidizing the cost of debt, many countries could provide the same level of incentive with less total support and at a lower cost. Part 3 of this series explores some of the considerations and tradeoffs that policymakers will need to consider in building a concessional debt program.

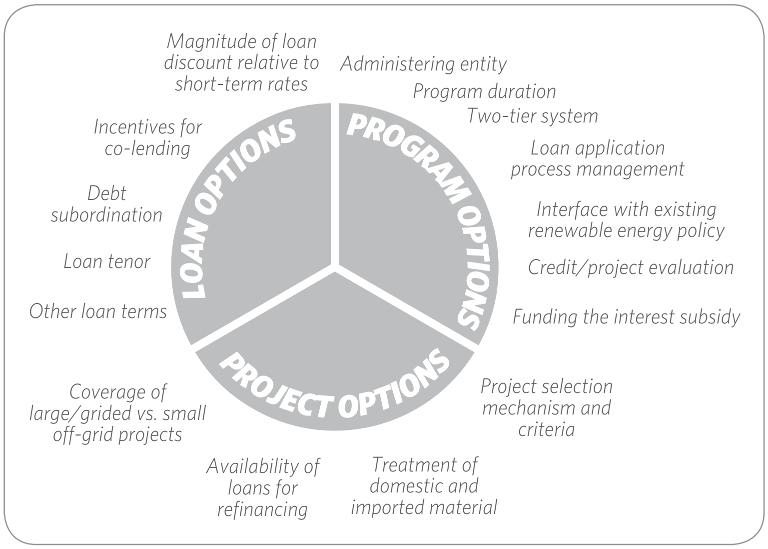
3 http://www.tradingeconomics.com/forecast/interest-rate

Brief 3: Establishing a Low-Cost Debt Financing Program – Options and Tradeoffs

Rapidly developing economies seeking to increase renewable energy deployment by lowering the cost of debt find themselves faced with many design and implementation questions. How should the loans be priced? Who should administer them? What terms should these loans offer and what kinds of projects should they cover? The value and success of the entire concessional debt program hinges on choosing the best options for a particular country.

The first two parts of this CPI series described mechanisms for efficiently lowering the cost of renewable energy in rapidly developing countries. However, the effectiveness of these mechanisms depends on how they are designed and implemented in particular contexts. This final part of the series outlines the tradeoffs facing policymakers in emerging economies around the world, highlighting in particular some of our analytical work in India.

Figure 7: Options for establishing a renewable energy low-cost debt financing program



As Figure 7 outlines, there are three types of decisions facing policymakers interested in building a concessional debt program for renewable energy. At an institutional level, the policymaker must decide how to structure the program, including the source and mechanism of funding, the administering agency, and the credit evaluation process. Secondly, the policymaker must decide which projects the newly formed concessional debt program will cover. Finally, structuring the loans requires making decisions about the characteristics of the loans themselves, including tenor, discount rate, and subordination.

There is no universal "right way" to design a concessional debt program. Each of the options described in this paper involves allocating risk and cost among the government, the project developers, and any co-lenders. In certain contexts, governments may be able to assume a greater share of risk in order to lower the cost of financing renewable energy. However, governments are limited in the amount of risk that they can safely assume. Designing a truly effective concessional debt program will require careful evaluation of the risk and cost tradeoffs at each of the decision points described in this brief.

Program Design Options

The first step to developing a concessional loan program is to set out the program parameters and design of the institutions that will establish, administer, and monitor the program. This brief outlines the tradeoffs associated with program design options.

Administering Entity

Governments could choose to administer low-cost loans themselves or make a subsidy available to commercial banks so that they could then pass the discount onto their borrowers.

In administering the program itself, the government would clearly maintain more control and could avoid the less than optimum allocation that could potentially come from the biases of the commercial lenders. It may also be easier to ensure that the entire value of the debt subsidy is passed through to the developer.

On the other hand, the government could take on a significant administrative burden with the associated costs and could be liable for real or perceived distortions due to political interference and bias. Meanwhile, many of the capabilities required to implement such a program – for example credit and project evaluation – may already exist in the commercial banks.

A third option would be to create an independent entity to reduce perceptions of government interference, however the time and costs of setting the entity up and the subsequent governance and administrative issues will also create a burden.

There is no perfect solution, but the choice should depend upon the relative risks and costs associated with administering the program on the one hand and the risk of interference or sub optimum project selection on the other. Regulatory, governance, and program design mechanisms, such as open bidding for project selection, can also significantly reduce the risks associated with any of the three options.

While our discussions in India revealed a strong consensus in favor of a central, government-led approach, some other countries seem inclined to create a more independent entity or to use the commercial banks. In either case, once that decision is made, the selection of the appropriate entity or entities may also be difficult, as several groups may be qualified to perform some of the relevant administrative and analytical tasks.

Project Selection and Credit Evaluation

Within program administration, two of the more difficult tasks are first creating the project flow and then choosing which of the projects that apply should receive the low-cost loans. Again, ensuring that the process is transparent and free from manipulation is important. Setting minimum standards, developing rigorous project selection evaluation and pre-approval processes, and possibly standardized bidding and tendering processes can all help achieve this goal. The markets selected may also influence how the program is administered. If the program addresses small-scale commercial and residential projects as well as large projects, additional processes will be necessary, in particular the evaluation of projects and credit on a retail, mass market scale. It is possible that different institutional/administrative solutions might work better for different market segments.

Program Duration

Concessional debt programs will only be useful as long as interest rates and renewable energy costs remain high. Stakeholders in India felt strongly that any concessional debt program should be accompanied by a strict termination date to avoid entrenching a system for no reason other than historical precedent. However, extended program duration may also lower financing costs by reducing the risk faced by project developers.

Program Scope

Making these loans widely available to a broad section of renewable energy projects is clearly desirable. The question is whether the concessional debt program should be the only channel for renewable energy finance, or whether conventionally financed projects should continue to be encouraged, either through separate tariff regimes or limitations imposed on low-cost loans. While maintaining separate systems could be expensive, some countries may choose to do so in order to allow different, more innovative channels for project financing.

Interface with Existing Renewable Energy Policy

In countries where policy making is devolved to sub-national governments like states or provinces, low-cost loans could be an important part of encouraging them to both develop their own policies and increase their ambitions. These low-cost loans could distribute the cost of policies like renewable portfolio obligations between the state and national government and access to more low-cost loans could be made contingent upon more ambitious sub-national government targets for renewable energy. States would need to adjust their renewable energy procurement mechanisms to accommodate the loans. In order to both realize the benefits of these lower costs, states would need to create separate tariffs or auctions for projects enjoying the advantages of this low-cost financing with prices set to ensure that they deliver cheaper power and not only more profit for developers. .

Funding the Interest Subsidy

Governments could directly fund concessional debt programs, essentially providing a subsidy to subnational governments. Since the national government has lower borrowing costs, funding the debt program at the national level may be cost effective. On the other hand, states and/or electricity payers could contribute to the cost of providing low-cost debt. To strike the right balance, while still taking advantage of the national government's lower borrowing costs, the national level could ask states for some degree of contribution to the reduction in the loan's interest rate.

Project Choice Options

The second set of decisions in developing a concessional loan program is evaluating which types of projects the program should cover. This section of the paper outlines the tradeoffs associated with project choice options.

Coverage of Large/Gridded vs. Small Off-Grid Projects

Concessional debt programs will need to decide whether to cover off-grid, rural, and small-scale distributed generation in addition to large-scale, grid-connected projects. Loan evaluation and distribution is likely to be easier for larger projects connected to standard regulatory regimes. Thus, it will be easier to develop this proposal for large-scale, grid-connected projects. However, some of the benefits of such a program, for example improvement of current account balances by reducing oil imports, are likely to be greater for off-grid applications where the electricity generated may be used to replace diesel generation. More analysis is required but the best solution may be to provide two distinct facilities, with different evaluation, pricing, and disbursement mechanisms, for utility-scale and off-grid projects.

Availability of Loans for Refinancing

Only loans that are approved before the final investment decision is made are incorporated into the developer's investment decisions. Therefore, decisions made after this point will not be reflected in the power purchase agreement price and, therefore, are unlikely to lead to lower bids or electricity prices. However, such loans could free up capital for further investment. While this may also be a goal, these loans do not need to carry the lower interest rates, as the difference in interest rates will only result in more profit for the developer and will not be passed on to consumers. Therefore, in most cases, we recommend that these low-cost loans are only made for new projects.

Treatment of Domestic and Imported Content

Two arguments superficially support loans only covering domestic costs (such as labor, land, and locally manufactured renewable energy equipment).

The first is that such a restriction prevents local government funds from supporting overseas manufacturers. However, if the primary goal is to reduce the overall cost of meeting renewable energy targets, then this argument does not hold. A properly structured reverse auction which requires project developers to compete on price by bidding down a pre-determined tariff would lead to all of this value being passed on to consumers and taxpayers rather than equipment suppliers. Further, creating market distortions that favor one type of (potentially more expensive) equipment over another could undermine efficiency.

The second argument for limiting low-cost loans to domestic content is that there may be foreign loan support for the purchase of overseas components. This argument is more compelling, but with proper structuring the foreign loans could be combined beneficially with local concessional loans.

Loan Parameter Options

The third set of decisions in developing a concessional loan program is determining the loan parameter options. This section of the paper outlines the choices and associated risk and cost tradeoffs.

Magnitude of Loan Discount Relative to Short-Term Rates

Higher loan discounts should lead to larger reductions in the cost of supporting renewable energy. For example, in India, our modeling indicated that while a 3% interest rate concession would reduce the total cost of renewable energy support for wind by 16%, a 7% concession would reduce the cost of support by nearly 40%. The benefits in a given country will depend upon a final evaluation of the costs of providing this type of finance, the method through which the money is raised, and the extent to which existing policies will provide a portion of the total incentive required. The result may also vary by technology.

Incentives for Co-Lending

At its most simple, a concessional debt program could provide all of the debt that a project would be expected to bear (for example, 70% of total project cost). Such a strategy could also relieve over-exposure of commercial banks to infrastructure investment, where that is an issue. However, given a limited budget, governments could fund a greater number of projects by limiting the debt levels – for example, to 50% of expected project cost. Commercial lenders could then lend money to the project alongside the low-cost loan facility. These lenders might offer relatively cheap debt, given the degree of risk protection provided by the governments' low-cost loans and the verification process that would entail. Getting commercial lenders involved could encourage financial innovation in the sector, help develop the renewable energy finance sector, and provide additional feedback to the lending agency. On the other hand, larger discounts would need to be offered to provide the same level of incentive, and coordination between lenders might be difficult.

Debt Subordination

Assuming that the loan program allows or encourages commercial co-lenders, a key question is whether government or commercial debt should be subordinate. Clearly commercial lenders would be more likely to offer lower interest rates if the government also accepts first losses arising from a project developer failing to repay the loan. In that case, the commercial debt would have a very high degree of security, with only a disastrous collapse of the project leading to non-payment. Of course, accepting first losses would require that the government accept a risk, which has a cost that can only partially be offset by the government's greater powers of enforcement.

Loan Tenor

Our research has shown that increasing loan duration can significantly lower financing costs (and therefore electricity costs) for renewable energy. For example, in India, increasing the duration of a loan by six years can lower levelized costs of electricity by 6-8%. In general, loan durations of at least 10-15 years significantly lower levelized costs. However, increasing loan duration also increases the costs borne by the government.

Other Loan Terms

Various covenants and conditions may be attached to the loan to limit risk and to ensure that the loan leads to renewable energy cost savings.

Conclusion

While there is no "right way" to design a program for lowering the cost of renewable energy, thoughtful analysis of each of these decision points can help policymakers to design an effective financing program.